

$a_2(1320)$

$$I^G(J^{PC}) = 1^-(2^{++})$$

NODE=M012

 $a_2(1320)$ MASS

NODE=M012205

VALUE (MeV)

DOCUMENT ID

NODE=M012M0

1318.3^{+0.5}_{-0.6} OUR AVERAGE Includes data from the 4 datablocks that follow this one.
Error includes scale factor of 1.2.

3 π MODE

VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT

NODE=M012M1

NODE=M012M1

The data in this block is included in the average printed for a previous datablock.

1319.0^{+1.0}_{-1.3} OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.

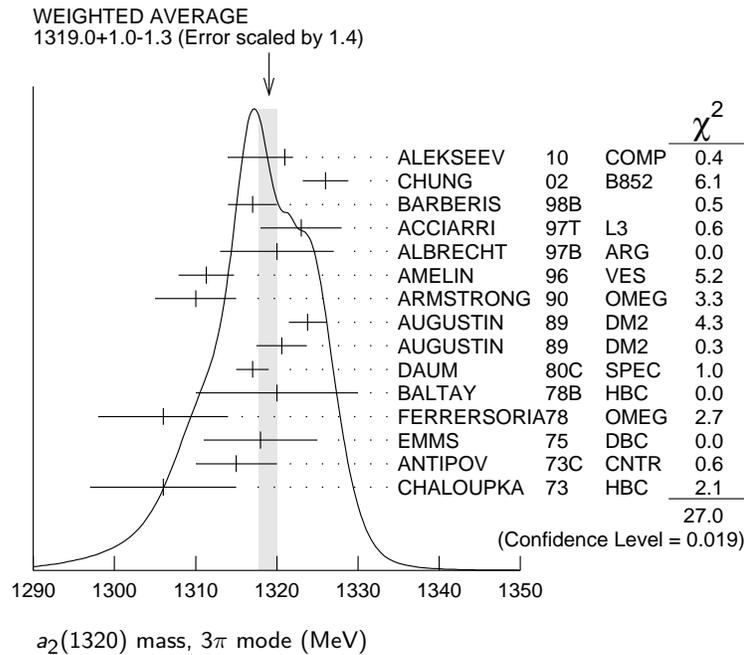
1321	± 1	$\frac{+0}{-7}$	420k	ALEKSEEV	10	COMP	190	$\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$	
1326	± 2	± 2		CHUNG	02	B852	18.3	$\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$	
1317	± 3			BARBERIS	98B		450	$pp \rightarrow pf \pi^+ \pi^- \pi^0 p_s$	
1323	± 4	± 3		ACCIARRI	97T	L3		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$	
1320	± 7			ALBRECHT	97B	ARG		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$	
1311.3	± 1.6	± 3.0	72.4k	AMELIN	96	VES	36	$\pi^- p \rightarrow \pi^+ \pi^- \pi^0 n$	
1310	± 5			ARMSTRONG	90	OMEG 0	300.0	$pp \rightarrow pp \pi^+ \pi^- \pi^0$	
1323.8	± 2.3		4022	AUGUSTIN	89	DM2 \pm		$J/\psi \rightarrow \rho^\pm a_2^\mp$	
1320.6	± 3.1		3562	AUGUSTIN	89	DM2 0		$J/\psi \rightarrow \rho^0 a_2^0$	OCCUR=2
1317	± 2		25k	¹ DAUM	80C	SPEC -	63,94	$\pi^- p \rightarrow 3\pi p$	
1320	± 10		1097	¹ BALTAY	78B	HBC +0	15	$\pi^+ p \rightarrow p4\pi$	
1306	± 8			FERRERSORIA	78	OMEG -	9	$\pi^- p \rightarrow p3\pi$	
1318	± 7		1.6k	¹ EMMS	75	DBC 0	4	$\pi^+ n \rightarrow p(3\pi)^0$	
1315	± 5			¹ ANTIPOV	73C	CNTR -	25,40	$\pi^- p \rightarrow p\eta \pi^-$	
1306	± 9		1580	CHALOUPKA	73	HBC -	3.9	$\pi^- p$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●									
1300	± 2	± 4	18k	² SCHEGELSKY	06	RVUE 0		$\gamma\gamma \rightarrow \pi^+ \pi^- \pi^0$	
1305	± 14			CONDO	93	SHF		$\gamma p \rightarrow n\pi^+ \pi^+ \pi^-$	
1310	± 2			¹ EVANGELIS...	81	OMEG -	12	$\pi^- p \rightarrow 3\pi p$	
1343	± 11		490	BALTAY	78B	HBC 0	15	$\pi^+ p \rightarrow \Delta 3\pi$	OCCUR=2
1309	± 5		5k	BINNIE	71	MMS -		$\pi^- p$ near a_2 thresh- old	OCCUR=2
1299	± 6		28k	BOWEN	71	MMS -	5	$\pi^- p$	
1300	± 6		24k	BOWEN	71	MMS +	5	$\pi^+ p$	OCCUR=2
1309	± 4		17k	BOWEN	71	MMS -	7	$\pi^- p$	OCCUR=3
1306	± 4		941	ALSTON-...	70	HBC +	7.0	$\pi^+ p \rightarrow 3\pi p$	

¹From a fit to $J^P = 2^+ \rho\pi$ partial wave.

²From analysis of L3 data at 183–209 GeV.

NODE=M012M1;LINKAGE=P

NODE=M012M1;LINKAGE=SC

 **$K\bar{K}$ MODE**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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The data in this block is included in the average printed for a previous datablock.

NODE=M012M2
NODE=M012M2

1318.1± 0.7 OUR AVERAGE

1319 ± 5	4700	^{3,4} CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K_S^0 K^+ p$	OCCUR=2
1324 ± 6	5200	^{3,4} CLELAND	82B	SPEC	-	50 $\pi^- p \rightarrow K_S^0 K^- p$	OCCUR=3
1320 ± 2	4000	CHABAUD	80	SPEC	-	17 $\pi^- A \rightarrow K_S^0 K^- A$	
1312 ± 4	11000	CHABAUD	78	SPEC	-	9.8 $\pi^- p \rightarrow K^- K_S^0 p$	
1316 ± 2	4730	CHABAUD	78	SPEC	-	18.8 $\pi^- p \rightarrow K^- K_S^0 p$	OCCUR=2
1318 ± 1		^{3,5} MARTIN	78D	SPEC	-	10 $\pi^- p \rightarrow K_S^0 K^- p$	
1320 ± 2	2724	MARGULIE	76	SPEC	-	23 $\pi^- p \rightarrow K^- K_S^0 p$	
1313 ± 4	730	FOLEY	72	CNTR	-	20.3 $\pi^- p \rightarrow K^- K_S^0 p$	
1319 ± 3	1500	⁵ GRAYER	71	ASPK	-	17.2 $\pi^- p \rightarrow K^- K_S^0 p$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

1304 ± 10	870	⁶ SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$	
1330 ± 11	1000	^{3,4} CLELAND	82B	SPEC	+	30 $\pi^+ p \rightarrow K_S^0 K^+ p$	
1324 ± 5	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \rightarrow K^+ K_S^0 p$	

³From a fit to $J^P = 2^+$ partial wave.

⁴Number of events evaluated by us.

⁵Systematic error in mass scale subtracted.

⁶From analysis of L3 data at 91 and 183–209 GeV.

NODE=M012M2;LINKAGE=P
NODE=M012M2;LINKAGE=W
NODE=M012M2;LINKAGE=S
NODE=M012M2;LINKAGE=SC

 $\eta\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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The data in this block is included in the average printed for a previous datablock.

NODE=M012M3
NODE=M012M3

1317.7±1.4 OUR AVERAGE

1308 ± 9		BARBERIS	00H			450 $pp \rightarrow p_f \eta \pi^0 p_s$	
1316 ± 9		BARBERIS	00H			450 $pp \rightarrow$ $\Delta_f^{++} \eta \pi^- p_s$	OCCUR=2
1317 ± 1 ± 2		THOMPSON	97	MPS		18 $\pi^- p \rightarrow \eta \pi^- p$	
1315 ± 5 ± 2		⁷ AMSLER	94D	CBAR		0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$	
1325.1±5.1		AOYAGI	93	BKEI		$\pi^- p \rightarrow \eta \pi^- p$	
1317.7±1.4±2.0		BELADIDZE	93	VES		37 $\pi^- N \rightarrow \eta \pi^- N$	
1323 ± 8	1000	⁸ KEY	73	OSPK	-	6 $\pi^- p \rightarrow p \pi^- \eta$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

1309 ± 4		ANISOVICH	09	RVUE		$\bar{p} p, \pi N$	
1324 ± 5		ARMSTRONG	93C	E760	0	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$	
1336.2±1.7	2561	DELFOSE	81	SPEC	+	$\pi^\pm p \rightarrow p \pi^\pm \eta$	
1330.7±2.4	1653	DELFOSE	81	SPEC	-	$\pi^\pm p \rightarrow p \pi^\pm \eta$	OCCUR=2
1324 ± 8	6200	^{8,9} CONFORTO	73	OSPK	-	6 $\pi^- p \rightarrow p \pi^- \eta$	

⁷ The systematic error of 2 MeV corresponds to the spread of solutions.

⁸ Error includes 5 MeV systematic mass-scale error.

⁹ Missing mass with enriched MMS = $\eta\pi^-$, $\eta = 2\gamma$.

NODE=M012M3;LINKAGE=DD

NODE=M012M3;LINKAGE=E

NODE=M012M3;LINKAGE=M

$\eta'\pi$ MODE

VALUE (MeV) _____ DOCUMENT ID _____ TECN _____ COMMENT _____

The data in this block is included in the average printed for a previous datablock.

NODE=M012M4

NODE=M012M4

1322 \pm 7 OUR AVERAGE

1318 \pm 8 $\begin{smallmatrix} +3 \\ -5 \end{smallmatrix}$	IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
1327.0 \pm 10.7	BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta' \pi^- N$

$a_2(1320)$ WIDTH

NODE=M012210

3 π MODE

VALUE (MeV) _____ EVTS _____ DOCUMENT ID _____ TECN _____ CHG _____ COMMENT _____

NODE=M012W1

NODE=M012W1

105.0 $\begin{smallmatrix} +1.6 \\ -1.9 \end{smallmatrix}$ OUR AVERAGE

110 \pm 2 $\begin{smallmatrix} +2 \\ -15 \end{smallmatrix}$	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$	
108 \pm 3 \pm 15		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$	
120 \pm 10		BARBERIS	98B		450 $pp \rightarrow p_f \pi^+ \pi^- \pi^0 p_s$	
105 \pm 10 \pm 11		ACCIARRI	97T	L3	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$	
120 \pm 10		ALBRECHT	97B	ARG	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$	
103.0 \pm 6.0 \pm 3.3	72.4k	AMELIN	96	VES	36 $\pi^- p \rightarrow \pi^+ \pi^- \pi^0 n$	
120 \pm 10		ARMSTRONG	90	OMEG 0	300.0 $pp \rightarrow pp \pi^+ \pi^- \pi^0$	
107.0 \pm 9.7	4022	AUGUSTIN	89	DM2 \pm	$J/\psi \rightarrow \rho^\pm a_2^\mp$	
118.5 \pm 12.5	3562	AUGUSTIN	89	DM2 0	$J/\psi \rightarrow \rho^0 a_2^0$	OCCUR=2
97 \pm 5		¹⁰ EVANGELIS...	81	OMEG -	12 $\pi^- p \rightarrow 3\pi p$	
96 \pm 9	25k	¹⁰ DAUM	80C	SPEC -	63,94 $\pi^- p \rightarrow 3\pi p$	
110 \pm 15	1097	¹⁰ BALTAY	78B	HBC +0	15 $\pi^+ p \rightarrow p 4\pi$	
112 \pm 18	1.6k	¹⁰ EMMS	75	DBC 0	4 $\pi^+ n \rightarrow p(3\pi)^0$	
122 \pm 14	1.2k	^{10,11} WAGNER	75	HBC 0	7 $\pi^+ p \rightarrow \Delta^{++}(3\pi)^0$	
115 \pm 15		¹⁰ ANTIPOV	73C	CNTR -	25,40 $\pi^- p \rightarrow p \eta \pi^-$	
99 \pm 15	1580	CHALOUPKA	73	HBC -	3.9 $\pi^- p$	
105 \pm 5	28k	BOWEN	71	MMS -	5 $\pi^- p$	
99 \pm 5	24k	BOWEN	71	MMS +	5 $\pi^+ p$	OCCUR=2
103 \pm 5	17k	BOWEN	71	MMS -	7 $\pi^- p$	OCCUR=3

• • • We do not use the following data for averages, fits, limits, etc. • • •

117 \pm 6 \pm 20	18k	¹² SCHEGELSKY	06	RVUE 0	$\gamma\gamma \rightarrow \pi^+ \pi^- \pi^0$	
120 \pm 40		CONDO	93	SHF	$\gamma p \rightarrow n \pi^+ \pi^+ \pi^-$	
115 \pm 14	490	BALTAY	78B	HBC 0	15 $\pi^+ p \rightarrow \Delta 3\pi$	OCCUR=2
72 \pm 16	5k	BINNIE	71	MMS -	$\pi^- p$ near a_2 thresh-	OCCUR=2
79 \pm 12	941	ALSTON-...	70	HBC +	$7.0 \pi^+ p \rightarrow 3\pi p$	

¹⁰ From a fit to $J^P = 2^+ \rho\pi$ partial wave.

¹¹ Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

¹² From analysis of L3 data at 183–209 GeV.

NODE=M012W1;LINKAGE=P

NODE=M012W1;LINKAGE=S

NODE=M012W1;LINKAGE=SC

$K\bar{K}$ AND $\eta\pi$ MODES

VALUE (MeV) _____ DOCUMENT ID _____

107 \pm 5 OUR ESTIMATE

110.4 \pm 1.7 OUR AVERAGE Includes data from the 2 datablocks that follow this one.

NODE=M012W0

NODE=M012W0

→ UNCHECKED ←

$K\bar{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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The data in this block is included in the average printed for a previous datablock.

NODE=M012W2
 NODE=M012W2

109.8 ± 2.4 OUR AVERAGE

112 ± 20	4700	13,14 CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K_S^0 K^+ p$	OCCUR=2
120 ± 25	5200	13,14 CLELAND	82B	SPEC	-	50 $\pi^- p \rightarrow K_S^0 K^- p$	OCCUR=3
106 ± 4	4000	CHABAUD	80	SPEC	-	17 $\pi^- A \rightarrow K_S^0 K^- A$	
126 ± 11	11000	CHABAUD	78	SPEC	-	9.8 $\pi^- p \rightarrow K^- K_S^0 p$	
101 ± 8	4730	CHABAUD	78	SPEC	-	18.8 $\pi^- p \rightarrow K^- K_S^0 p$	OCCUR=2
113 ± 4		13,15 MARTIN	78D	SPEC	-	10 $\pi^- p \rightarrow K_S^0 K^- p$	
105 ± 8	2724	15 MARGULIE	76	SPEC	-	23 $\pi^- p \rightarrow K^- K_S^0 p$	
113 ± 19	730	FOLEY	72	CNTR	-	20.3 $\pi^- p \rightarrow K^- K_S^0 p$	
123 ± 13	1500	15 GRAYER	71	ASPK	-	17.2 $\pi^- p \rightarrow K^- K_S^0 p$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

120 ± 15	870	16 SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$	
121 ± 51	1000	13,14 CLELAND	82B	SPEC	+	30 $\pi^+ p \rightarrow K_S^0 K^+ p$	
110 ± 18	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \rightarrow K^+ K_S^0 p$	

¹³ From a fit to $J^P = 2^+$ partial wave.¹⁴ Number of events evaluated by us.¹⁵ Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.¹⁶ From analysis of L3 data at 91 and 183–209 GeV.

NODE=M012W2;LINKAGE=P
 NODE=M012W2;LINKAGE=W
 NODE=M012W2;LINKAGE=S
 NODE=M012W2;LINKAGE=SC

 $\eta\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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The data in this block is included in the average printed for a previous datablock.

NODE=M012W3
 NODE=M012W3

111.1 ± 2.4 OUR AVERAGE

115 ± 20		BARBERIS	00H			450 $p p \rightarrow p_f \eta \pi^0 p_s$	
112 ± 14		BARBERIS	00H			450 $p p \rightarrow \Delta_f^{++} \eta \pi^- p_s$	OCCUR=2
112 ± 3 ± 2		17 AMSLER	94D	CBAR		0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$	
103 ± 6 ± 3		BELADIDZE	93	VES		37 $\pi^- N \rightarrow \eta \pi^- N$	
112.2 ± 5.7	2561	DELFOSSÉ	81	SPEC	+	$\pi^\pm p \rightarrow p \pi^\pm \eta$	
116.6 ± 7.7	1653	DELFOSSÉ	81	SPEC	-	$\pi^\pm p \rightarrow p \pi^\pm \eta$	OCCUR=2
108 ± 9	1000	KEY	73	OSPK	-	6 $\pi^- p \rightarrow p \pi^- \eta$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

110 ± 4		ANISOVICH	09	RVUE		$\bar{p} p, \pi N$	
127 ± 2 ± 2		18 THOMPSON	97	MPS		18 $\pi^- p \rightarrow \eta \pi^- p$	
118 ± 10		ARMSTRONG	93C	E760	0	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$	
104 ± 9	6200	19 CONFORTO	73	OSPK	-	6 $\pi^- p \rightarrow p \pi^- \eta$	

¹⁷ The systematic error of 2 MeV corresponds to the spread of solutions.¹⁸ Resolution is not unfolded.¹⁹ Missing mass with enriched MMS = $\eta \pi^-$, $\eta = 2\gamma$.

NODE=M012W3;LINKAGE=DD
 NODE=M012W3;LINKAGE=A
 NODE=M012W3;LINKAGE=M

 $\eta'\pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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119 ± 25 OUR AVERAGE

140 ± 35 ± 20	IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
106 ± 32	BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta' \pi^- N$

NODE=M012W4
 NODE=M012W4

 $a_2(1320)$ DECAY MODES

NODE=M012215;NODE=M012

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1 3π	(70.1 ± 2.7) %	S=1.2
Γ_2 $\rho(770)\pi$		
Γ_3 $f_2(1270)\pi$		
Γ_4 $\rho(1450)\pi$		
Γ_5 $\eta\pi$	(14.5 ± 1.2) %	
Γ_6 $\omega\pi\pi$	(10.6 ± 3.2) %	S=1.3
Γ_7 $K\bar{K}$	(4.9 ± 0.8) %	
Γ_8 $\eta'(958)\pi$	(5.3 ± 0.9) × 10 ⁻³	
Γ_9 $\pi^\pm \gamma$	(2.68 ± 0.31) × 10 ⁻³	
Γ_{10} $\gamma\gamma$	(9.4 ± 0.7) × 10 ⁻⁶	
Γ_{11} $e^+ e^-$	< 5 × 10 ⁻⁹	CL=90%

DESIG=1
 DESIG=11
 DESIG=12
 DESIG=13
 DESIG=3
 DESIG=4
 DESIG=2
 DESIG=8
 DESIG=7
 DESIG=9
 DESIG=10

CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 18 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 = 9.3$ for 15 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	10		
x_6	-89	-46	
x_7	-1	-2	-24
	x_1	x_5	x_6

$a_2(1320)$ PARTIAL WIDTHS

NODE=M012220

$\Gamma(\eta\pi)$

 Γ_5

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

18.5 ± 3.0	870	²⁰ SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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²⁰ From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(a_2(1320) \rightarrow \gamma\gamma) = 0.91$ keV and SU(3) relations.

NODE=M012W6
NODE=M012W6

NODE=M012W6;LINKAGE=SC

$\Gamma(K\bar{K})$

 Γ_7

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

7.0 ^{+2.0} _{-1.5}	870	²¹ SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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²¹ From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(a_2(1320) \rightarrow \gamma\gamma) = 0.91$ keV and SU(3) relations.

NODE=M012W5
NODE=M012W5

NODE=M012W5;LINKAGE=SC

$\Gamma(\pi^\pm\gamma)$

 Γ_9

VALUE (keV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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287 ± 30 OUR AVERAGE

284 ± 25 ± 25	7100	MOLCHANOV 01	SELX		600 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
295 ± 60		CIHANGIR 82	SPEC	+	200 $\pi^+ A$

• • • We do not use the following data for averages, fits, limits, etc. • • •

461 ± 110		²² MAY 77	SPEC	±	9.7 γA
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²² Assuming one-pion exchange.

NODE=M012W7
NODE=M012W7

NODE=M012W;LINKAGE=M2

$\Gamma(\gamma\gamma)$

 Γ_{10}

VALUE (keV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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1.00 ± 0.06 OUR AVERAGE

0.98 ± 0.05 ± 0.09		ACCIARRI 97T	L3		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
0.96 ± 0.03 ± 0.13		ALBRECHT 97B	ARG		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
1.26 ± 0.26 ± 0.18	36	BARU 90	MD1		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
1.00 ± 0.07 ± 0.15	415	BEHREND 90C	CELL	0	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
1.03 ± 0.13 ± 0.21		BUTLER 90	MRK2		$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
1.01 ± 0.14 ± 0.22	85	OEST 90	JADE		$e^+ e^- \rightarrow e^+ e^- \pi^0 \eta$
0.90 ± 0.27 ± 0.15	56	²³ ALTHOFF 86	TASS	0	$e^+ e^- \rightarrow e^+ e^- 3\pi$
1.14 ± 0.20 ± 0.26		²⁴ ANTREASYAN 86	CBAL	0	$e^+ e^- \rightarrow e^+ e^- \pi^0 \eta$
1.06 ± 0.18 ± 0.19		BERGER 84C	PLUT	0	$e^+ e^- \rightarrow e^+ e^- 3\pi$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.81 ± 0.19 ^{+0.42} _{-0.11}	35	²³ BEHREND 83B	CELL	0	$e^+ e^- \rightarrow e^+ e^- 3\pi$
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0.77 ± 0.18 ± 0.27	22	²⁴ EDWARDS 82F	CBAL	0	$e^+ e^- \rightarrow e^+ e^- \pi^0 \eta$
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²³ From $\rho\pi$ decay mode.

²⁴ From $\eta\pi^0$ decay mode.

NODE=M012W9
NODE=M012W9NODE=M012W;LINKAGE=F
NODE=M012W;LINKAGE=G

$\Gamma(e^+e^-)$ Γ_{11}

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
< 0.56	90	ACHASOV	00K SND	$e^+e^- \rightarrow \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<25	90	VOROBYEV	88 ND	$e^+e^- \rightarrow \pi^0\eta$

NODE=M012W10
 NODE=M012W10

 $a_2(1320) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M012223

 $\Gamma(3\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_{10}/\Gamma$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.65±0.02±0.02	18k	²⁵ SCHEGELSKY 06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
²⁵ From analysis of L3 data at 183–209 GeV.				

NODE=M012G2
 NODE=M012G2

NODE=M012G2;LINKAGE=SC

 $\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_{10}/\Gamma$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.145 ^{+0.097} _{-0.034}	²⁶ UEHARA 09A	BELL	$e^+e^- \rightarrow e^+e^-\eta\pi^0$
²⁶ From the D_2 -wave. The fraction of the D_0 -wave is 3.4 ^{+2.3} _{-1.1} %.			

NODE=M012G01
 NODE=M012G01

NODE=M012G01;LINKAGE=UE

 $\Gamma(K\bar{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_{10}/\Gamma$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.126±0.007±0.028	²⁷ ALBRECHT 90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.081±0.006±0.027	²⁸ ALBRECHT 90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$
²⁷ Using an incoherent background.			
²⁸ Using a coherent background.			

NODE=M012G1
 NODE=M012G1

OCCUR=2

NODE=M012G1;LINKAGE=A
 NODE=M012G1;LINKAGE=B

 $a_2(1320) \text{ BRANCHING RATIOS}$

NODE=M012225

 $[\Gamma(f_2(1270)\pi) + \Gamma(\rho(1450)\pi)]/\Gamma(\rho(770)\pi)$ $(\Gamma_3+\Gamma_4)/\Gamma_2$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<0.12	90	ABRAMOVI... 70B	HBC	-	3.93 π^-p

NODE=M012R9
 NODE=M012R9

 $\Gamma(\eta\pi)/\Gamma(3\pi)$ Γ_5/Γ_1

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
0.207±0.018 OUR FIT					
0.213±0.020 OUR AVERAGE					
0.18 ±0.05		FORINO 76	HBC		11 π^-p
0.22 ±0.05	52	ANTIPOV 73	CNTR	-	40 π^-p
0.211±0.044	149	CHALOUPKA 73	HBC	-	3.9 π^-p
0.246±0.042	167	ALSTON-... 71	HBC	+	7.0 π^+p
0.25 ±0.09	15	BOECKMANN 70	HBC	+	5.0 π^+p
0.23 ±0.08	22	ASCOLI 68	HBC	-	5 π^-p
0.12 ±0.08		CHUNG 68	HBC	-	3.2 π^-p
0.22 ±0.09		CONTE 67	HBC	-	11.0 π^-p

NODE=M012R3
 NODE=M012R3

 $\Gamma(\omega\pi\pi)/\Gamma(3\pi)$ Γ_6/Γ_1

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
0.15±0.05 OUR FIT Error includes scale factor of 1.3.					
0.15±0.05 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
0.28±0.09	60	DIAZ 74	DBC	0	6 π^+n
0.18±0.08		²⁹ KARSHON 74	HBC		Avg. of above two
0.10±0.05	279	CHALOUPKA 73	HBC	-	3.9 π^-p
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.29±0.08	140	²⁹ KARSHON 74	HBC	0	4.9 π^+p
0.10±0.04	60	²⁹ KARSHON 74	HBC	+	4.9 π^+p
0.19±0.08		DEFOIX 73	HBC	0	0.7 $\bar{p}p$

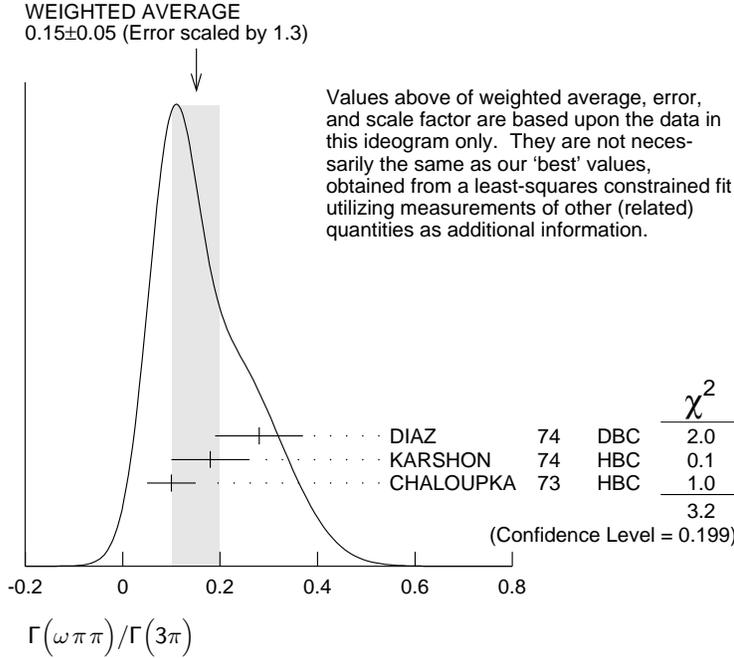
NODE=M012R12
 NODE=M012R12

OCCUR=3

OCCUR=2

²⁹ KARSHON 74 suggest an additional $I = 0$ state strongly coupled to $\omega\pi\pi$ which could explain discrepancies in branching ratios and masses. We use a central value and a systematic spread.

NODE=M012R12;LINKAGE=K



$\Gamma(K\bar{K})/\Gamma(3\pi)$

Γ_7/Γ_1

NODE=M012R1
NODE=M012R1

VALUE EVTS DOCUMENT ID TECN CHG COMMENT

0.070±0.012 OUR FIT

0.078±0.017 CHABAUD 78 RVUE

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.011±0.003	30	BERTIN	98B	OBLX	0.0	$\bar{p}p \rightarrow K^\pm K_s \pi^\mp$
0.056±0.014	50	31 CHALOUPKA	73	HBC	-	3.9 $\pi^- p$
0.097±0.018	113	31 ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
0.06 ±0.03		31 ABRAMOVI...	70B	HBC	-	3.93 $\pi^- p$
0.054±0.022		31 CHUNG	68	HBC	-	3.2 $\pi^- p$

³⁰ Using 4π data from BERTIN 97D.

³¹ Included in CHABAUD 78 review.

NODE=M012R1;LINKAGE=BE
NODE=M012R1;LINKAGE=C

$\Gamma(K\bar{K})/\Gamma(\eta\pi)$

Γ_7/Γ_5

NODE=M012R14
NODE=M012R14

VALUE DOCUMENT ID TECN COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.08±0.02 ³² BERTIN 98B OBLX 0.0 $\bar{p}p \rightarrow K^\pm K_s \pi^\mp$

³² Using $\eta\pi\pi$ data from AMSLER 94D.

NODE=M012R14;LINKAGE=BE

$\Gamma(\eta\pi)/[\Gamma(3\pi) + \Gamma(\eta\pi) + \Gamma(K\bar{K})]$

$\Gamma_5/(\Gamma_1+\Gamma_5+\Gamma_7)$

NODE=M012R2
NODE=M012R2

VALUE EVTS DOCUMENT ID TECN CHG COMMENT

0.162±0.012 OUR FIT

0.140±0.028 OUR AVERAGE

0.13 ±0.04		ESPIGAT	72	HBC	±	0.0 $\bar{p}p$
0.15 ±0.04	34	BARNHAM	71	HBC	+	3.7 $\pi^+ p$

$\Gamma(K\bar{K})/[\Gamma(3\pi) + \Gamma(\eta\pi) + \Gamma(K\bar{K})]$

$\Gamma_7/(\Gamma_1+\Gamma_5+\Gamma_7)$

NODE=M012R8
NODE=M012R8

VALUE EVTS DOCUMENT ID TECN CHG COMMENT

0.054±0.009 OUR FIT

0.048±0.012 OUR AVERAGE

0.05 ±0.02		TOET	73	HBC	+	5 $\pi^+ p$
0.09 ±0.04		TOET	73	HBC	0	5 $\pi^+ p$
0.03 ±0.02	8	DAMERI	72	HBC	-	11 $\pi^- p$
0.06 ±0.03	17	BARNHAM	71	HBC	+	3.7 $\pi^+ p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.020±0.004 ³³ ESPIGAT 72 HBC ± 0.0 $\bar{p}p$

³³ Not averaged because of discrepancy between masses from $K\bar{K}$ and $\rho\pi$ modes.

OCCUR=2

NODE=M012R8;LINKAGE=A

$\Gamma(\eta'(958)\pi)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.006	95	ALDE	92B	GAM2	$38,100 \pi^- p \rightarrow \eta' \pi^0 n$
<0.02	97	BARNHAM	71	HBC	+ $3.7 \pi^+ p$
0.004 ± 0.004		BOESEBECK	68	HBC	+ $8 \pi^+ p$

NODE=M012R4
NODE=M012R4

 $\Gamma(\eta'(958)\pi)/\Gamma(3\pi)$ Γ_8/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.011	90	EISENSTEIN	73	HBC	- $5 \pi^- p$
<0.04		ALSTON-...	71	HBC	+ $7.0 \pi^+ p$
$0.04^{+0.03}_{-0.04}$		BOECKMANN	70	HBC	0 $5.0 \pi^+ p$

NODE=M012R5
NODE=M012R5

 $\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$ Γ_8/Γ_5

VALUE	DOCUMENT ID	TECN	COMMENT
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0.037±0.006 OUR AVERAGE

0.032±0.009	ABELE	97C	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta'$
0.047±0.010±0.004	³⁴ BELADIDZE	93	VES	$37\pi^- N \rightarrow a_2^- N$
0.034±0.008±0.005	BELADIDZE	92	VES	$36\pi^- C \rightarrow a_2^- C$

³⁴ Using $B(\eta' \rightarrow \pi^+ \pi^- \eta) = 0.441$, $B(\eta \rightarrow \gamma\gamma) = 0.389$ and $B(\eta \rightarrow \pi^+ \pi^- \pi^0) = 0.236$.

NODE=M012R13
NODE=M012R13

NODE=M012R13;LINKAGE=A

 $\Gamma(\pi^\pm \gamma)/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.005^{+0.005}_{-0.003}$	³⁵ EISENBERG	72	HBC	4.3,5.25,7.5 γp
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³⁵ Pion-exchange model used in this estimation.

NODE=M012R11
NODE=M012R11

NODE=M012R11;LINKAGE=R

 $\Gamma(e^+ e^-)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE (units 10^{-9})	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<6	90	ACHASOV	00K	SND	$e^+ e^- \rightarrow \pi^0 \pi^0$
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NODE=M012R15
NODE=M012R15

 $a_2(1320)$ REFERENCES

NODE=M012

ALEKSEEV	10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)	REFID=53356
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
UEHARA	09A	PR D80 032001	S. Uehara <i>et al.</i>	(BELLE Collab.)	REFID=53002
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky <i>et al.</i>		REFID=51186
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky <i>et al.</i>		REFID=51185
CHUNG	02	PR D65 072001	S.U. Chung <i>et al.</i>	(BNL E852 Collab.)	REFID=48837
IVANOV	01	PRL 86 3977	E.I. Ivanov <i>et al.</i>	(BNL E852 Collab.)	REFID=48317
MOLCHANOV	01	PL B521 171	V.V. Molchanov <i>et al.</i>	(FNAL SELEX Collab.)	REFID=48559
ACHASOV	00K	PL B492 8	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)	REFID=47933
BARBERIS	00H	PL B488 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)	REFID=47964
BARBERIS	98B	PL B422 399	D. Barberis <i>et al.</i>	(WA 102 Collab.)	REFID=46345
BERTIN	98B	PL B434 180	A. Bertin <i>et al.</i>	(OBELIX Collab.)	REFID=46351
ABELE	97C	PL B404 179	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)	REFID=45531
ACCIARRI	97T	PL B413 147	M. Acciarri <i>et al.</i>	(L3 Collab.)	REFID=45761
ALBRECHT	97B	ZPHY C74 469	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=45418
THOMPSON	97	PRL 79 1630	D.R. Thompson <i>et al.</i>	(BNL E852 Collab.)	REFID=45584
AMELIN	96	ZPHY C70 71	D.V. Amelin <i>et al.</i>	(SERP, TBIL)	REFID=44649
AMSLER	94D	PL B333 277	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)	REFID=44093
AOYAGI	93	PL B314 246	H. Aoyagi <i>et al.</i>	(BKEI Collab.)	REFID=43599
ARMSTRONG	93C	PL B307 394	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)	REFID=43587
BELADIDZE	93	PL B313 276	G.M. Beladidze <i>et al.</i>	(VES Collab.)	REFID=43598
CONDO	93	PR D48 3045	G.T. Condo <i>et al.</i>	(SLAC Hybrid Collab.)	REFID=43600
ALDE	92B	ZPHY C54 549	D.M. Alde <i>et al.</i>	(SERP, BELG, LANL, LAPP+)	REFID=41852
BELADIDZE	92	ZPHY C54 235	G.M. Beladidze <i>et al.</i>	(VES Collab.)	REFID=42171
ALBRECHT	90G	ZPHY C48 183	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41374
ARMSTRONG	90	ZPHY C48 213	T.A. Armstrong, M. Benayoun, W. Beusch	(WA76 Coll.)	REFID=41375
BARU	90	ZPHY C48 581	S.E. Baru <i>et al.</i>	(MD-1 Collab.)	REFID=41366
BEHREND	90C	ZPHY C46 583	H.J. Behrend <i>et al.</i>	(CELLO Collab.)	REFID=41356
BUTLER	90	PR D42 1368	F. Butler <i>et al.</i>	(Mark II Collab.)	REFID=41363
OEST	90	ZPHY C47 343	T. Oest <i>et al.</i>	(JADE Collab.)	REFID=41358
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev <i>et al.</i>	(NOVO)	REFID=41023

Translated from YAF 48 436.

ALTHOFF	86	ZPHY C31 537	M. Althoff <i>et al.</i>	(TASSO Collab.)	REFID=21287
ANTREASYSAN	86	PR D33 1847	D. Antreasyan <i>et al.</i>	(Crystal Ball Collab.)	REFID=20469
BERGER	84C	PL 149B 427	C. Berger <i>et al.</i>	(PLUTO Collab.)	REFID=21286
BEHREND	83B	PL 125B 518 (erratum)	H.J. Behrend <i>et al.</i>	(CELLO Collab.)	REFID=20302
CIHANGIR	82	PL 117B 123	S. Cihangir <i>et al.</i>	(FNAL, MINN, ROCH)	REFID=21280
CLELAND	82B	NP B208 228	W.E. Cleland <i>et al.</i>	(DURH, GEVA, LAUS+)	REFID=21281
EDWARDS	82F	PL 110B 82	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)	REFID=20747
DELFOSSSE	81	NP B183 349	A. Delfosse <i>et al.</i>	(GEVA, LAUS)	REFID=21277
EVANGELIS...	81	NP B178 197	C. Evangelista <i>et al.</i>	(BARI, BONN, CERN+)	REFID=20462
CHABAUD	80	NP B175 189	V. Chabaud <i>et al.</i>	(CERN, MPIM, AMST)	REFID=21274
DAUM	80C	PL 89B 276	C. Daum <i>et al.</i>	(AMST, CERN, CRAC, MPIM+) JP	REFID=21275
BALTAY	78B	PR D17 62	C. Baltay <i>et al.</i>	(COLU, BING)	REFID=21265
CHABAUD	78	NP B145 349	V. Chabaud <i>et al.</i>	(CERN, MPIM)	REFID=21267
FERRERSORIA	78	PL 74B 287	A. Ferrer Soria <i>et al.</i>	(ORSAY, CERN, CDEF+)	REFID=21270
HYAMS	78	NP B146 303	B.D. Hyams <i>et al.</i>	(CERN, MPIM, ATEN)	REFID=21271
MARTIN	78D	PL 74B 417	A.D. Martin <i>et al.</i>	(DURH, GEVA) JP	REFID=21272
MAY	77	PR D16 1983	E.N. May <i>et al.</i>	(ROCH, CORN)	REFID=20450
FORINO	76	NC 35A 465	A. Forino <i>et al.</i>	(BGNA, FIRZ, GENO, MILA+)	REFID=21259
MARGULIE	76	PR D14 667	M. Margulies <i>et al.</i>	(BNL, CUNY)	REFID=21261
EMMS	75	PL 58B 117	M.J. Emms <i>et al.</i>	(BIRM, DURH, RHEL) JP	REFID=21254
WAGNER	75	PL 58B 201	F. Wagner, M. Tabak, D.M. Chew	(LBL) JP	REFID=20843
DIAZ	74	PRL 32 260	J. Diaz <i>et al.</i>	(CASE, CMU)	REFID=21248
KARSHON	74	PRL 32 852	U. Karshon <i>et al.</i>	(REHO)	REFID=21249
ANTIPOV	73	NP B63 175	Y.M. Antipov <i>et al.</i>	(CERN, SERP) JP	REFID=21238
ANTIPOV	73C	NP B63 153	Y.M. Antipov <i>et al.</i>	(CERN, SERP) JP	REFID=20817
CHALOUPKA	73	PL 44B 211	V. Chaloupka <i>et al.</i>	(CERN)	REFID=21242
CONFORTO	73	PL 45B 154	G. Conforto <i>et al.</i>	(EFI, FNAL, TNTO+)	REFID=21243
DEFOIX	73	PL 43B 141	C. Defoix <i>et al.</i>	(CDEF)	REFID=21244
EISENSTEIN	73	PR D7 278	L. Eisenstein <i>et al.</i>	(ILL)	REFID=21245
KEY	73	PRL 30 503	A.W. Key <i>et al.</i>	(TNTO, EFI, FNAL, WISC)	REFID=21246
TOET	73	NP B63 248	D.Z. Toet <i>et al.</i>	(NIJM, BONN, DURH, TORI)	REFID=20714
DAMERI	72	NC 9A 1	M. Dameri <i>et al.</i>	(GENO, MILA, SACL)	REFID=20338
EISENBERG	72	PR D5 15	Y. Eisenberg <i>et al.</i>	(REHO, SLAC, TELA)	REFID=20098
ESPIGAT	72	NP B36 93	P. Espigat <i>et al.</i>	(CERN, CDEF)	REFID=21232
FOLEY	72	PR D6 747	K.J. Foley <i>et al.</i>	(BNL, CUNY)	REFID=21233
ALSTON-...	71	PL 34B 156	M. Alston-Garnjost <i>et al.</i>	(LRL)	REFID=21214
BARNHAM	71	PRL 26 1494	K.W.J. Barnham <i>et al.</i>	(LBL)	REFID=21215
BINNIE	71	PL 36B 257	D.M. Binnie <i>et al.</i>	(LOIC, SHMP)	REFID=21217
BOWEN	71	PRL 26 1663	D.R. Bowen <i>et al.</i>	(NEAS, STON)	REFID=21219
GRAYER	71	PL 34B 333	G. Grayer <i>et al.</i>	(CERN, MPIM)	REFID=21223
ABRAMOVI...	70B	NP B23 466	M. Abramovich <i>et al.</i>	(CERN) JP	REFID=21195
ALSTON-...	70	PL 33B 607	M. Alston-Garnjost <i>et al.</i>	(LRL)	REFID=21196
BOECKMANN	70	NP B16 221	K. Boeckmann <i>et al.</i>	(BONN, DURH, NIJM+)	REFID=21202
ASCOLI	68	PRL 20 1321	G. Ascoli <i>et al.</i>	(ILL) JP	REFID=21171
BOESEBECK	68	NP B4 501	K. Boesebeck <i>et al.</i>	(AACH, BERL, CERN)	REFID=20585
CHUNG	68	PR 165 1491	S.U. Chung <i>et al.</i>	(LRL)	REFID=20059
CONTE	67	NC 51A 175	F. Conte <i>et al.</i>	(GENO, HAMB, MILA, SACL)	REFID=21166